

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1-89. (Canceled)

90. (Currently Amended) A diverse population of labels~~uniquely labeled probes~~, comprising thirty or more unique label~~target-specific polynucleotide probes~~ that each has~~have~~ a detectable signal that distinguishes it from the other polynucleotide probes of the population, wherein each of said unique label~~polynucleotide probes~~ comprises a molecule, said molecule~~comprising~~target-specific region and a region comprising a plurality of genes~~being of predetermined nucleotide sequence~~, wherein at least two of said genes have a different nucleotide sequence, wherein each different gene~~is attached to a respective corresponding anti-gene~~ is attached to a unique label monomer or a unique combination of label monomers, each said anti-gene~~being attached to at least one label monomer~~, and wherein said population is in solution.

91. (Currently Amended) A diverse population of labels~~uniquely labeled probes~~, comprising thirty or more unique label~~target-specific polynucleotide probes~~ that each has~~have~~ a detectable signal that distinguishes it from the other polynucleotide probes of the population, wherein each of said unique label~~polynucleotide probes~~ comprises a molecule, said molecule~~comprising~~:

(i) a region comprising a plurality of genes linked together in a unique combination, each gene being of predetermined nucleotide sequence, wherein at least two of said genes have a different nucleotide sequence, wherein each different gene~~is attached to a respective corresponding anti-gene~~ is attached to a unique label monomer or a unique combination of label monomers

~~combination of label monomers, each said anti-genedigit being attached to at least one label monomer; and~~

(ii) a target-specific region comprising a target-specific nucleotide sequence, said target-specific nucleotide sequence being non-covalently attached to an unlabeled bridging nucleic acid,

and wherein each unique label comprises a different target-specific region.

92. (Currently Amended) A diverse population of ~~labels~~uniquely labeled probes, comprising thirty or more ~~unique-label~~target-specific polynucleotide probes that each has a detectable signal that distinguishes it from the other polynucleotide probes of the population, wherein each of said ~~unique-label~~polynucleotide probes comprises a ~~molecule, said molecule~~ target-specific region and a region comprising a plurality of genedigits linked together in a unique combination, each genedigit being of predetermined nucleotide sequence, wherein at least two of said genedigits have a different nucleotide sequence, wherein each different genedigit is attached to a corresponding anti-genedigit having a unique label monomer or a combination of unique label monomers, each said anti-genedigit being attached to at least one label monomer, wherein each said ~~molecule and each said anti-genedigit is a nucleic acid and each said molecule-polynucleotide probe~~ is noncovalently attached to an unlabeled bridging nucleic acid.

93. (Currently Amended) A diverse population of ~~labels~~uniquely labeled probes, comprising thirty or more ~~unique-label~~target-specific polynucleotide probes that each has a detectable signal that distinguishes it from the other polynucleotide probes of the population, wherein each of said ~~unique-label~~polynucleotide probes comprises a synthetic nucleic acid molecule, said synthetic nucleic acid molecule comprising (i) a region comprising a plurality of genedigits linked together in a unique combination, each genedigit being of predetermined nucleotide sequence, wherein at least two of said genedigits have a different nucleotide sequence, wherein ~~are each different genedigit is~~ each different genedigit is attached to a respective corresponding anti-genedigit having a unique label monomer; ~~each said anti-genedigit being~~

~~attached to at least one label monomer,~~ and (ii) a target-specific region comprising a target-specific nucleotide sequence.

94. (Currently Amended) A diverse population of ~~labels~~uniquely labeled probes, comprising thirty or more ~~unique label~~target-specific polynucleotide probes that each has a detectable signal that distinguishes it from the other polynucleotide probes of the population, wherein each of said ~~unique labels~~polynucleotide probes comprises a target-specific region and a region~~molecule, said molecule~~ comprising a plurality of genes~~digits~~ linked together in a unique combination, each gene~~digit~~ being a DNA of predetermined nucleotide sequence, wherein at least two of said genes~~digits~~ have a different nucleotide sequence, wherein ~~are~~ each different gene~~digit is~~ attached to a ~~respective corresponding~~ anti-gene~~digit~~ having a unique label monomer, each said anti-gene~~digit~~ being an RNA ~~and being attached to at least one label monomer.~~

95. (Canceled)

96. (Currently Amended) The diverse population of claim 90, wherein each ~~said molecule and each said anti-gene~~digit is a nucleic acid and each said molecule~~polynucleotide probes~~ is noncovalently attached to an unlabeled bridging nucleic acid.

97. (Currently Amended) The diverse population of claim 90, wherein the ~~molecule~~polynucleotide probe is a synthetic nucleic acid molecule ~~which further comprises a target-specific nucleotide sequence.~~

98.-99. (Canceled)

100. (Currently Amended) The diverse population of claim 91, wherein the ~~molecule~~polynucleotide probe is a synthetic nucleic acid molecule ~~which further comprises a target-specific nucleotide sequence.~~

101. (Canceled)

102. (Currently Amended) The diverse population of claim 92, wherein the ~~molecule~~ polynucleotide probe is a synthetic nucleic acid molecule ~~which further comprises a target-specific nucleotide sequence.~~

103.-112. (Canceled)

113. (Currently Amended) The diverse population of claim 92, wherein the ~~molecule~~ polynucleotide probe is noncovalently attached to a target molecule.

114. (Currently Amended) The diverse population of claim 96, wherein the ~~molecule~~ polynucleotide probe is noncovalently attached to a target molecule.

115. (Currently Amended) The diverse population of claim ~~9990~~, wherein the ~~molecule~~ polynucleotide probe is noncovalently attached to a target molecule.

116. (Currently Amended) The diverse population of claim ~~10291~~, wherein the ~~molecule~~ polynucleotide probe is noncovalently attached to a target molecule.

117. (Currently Amended) The diverse population of claim ~~10393~~, wherein the ~~molecule~~ polynucleotide probe is noncovalently attached to a target molecule.

118. (Currently Amended) The diverse population of claim ~~10694~~, wherein the ~~molecule~~ polynucleotide probe is noncovalently attached to a target molecule.

119. (Currently Amended) The diverse population of claim ~~11197~~, wherein the polynucleotide probe~~molecule~~ is noncovalently attached to a target molecule.

120. (Currently Amended) The diverse population of any one of claims 113-119, wherein ~~the molecule and the target molecule is each~~ a DNA molecule and wherein said noncovalent attachment is via hybridization.

121. (Previously Presented) The diverse population of any one of claims 113-119, wherein the target molecule is unlabeled.

122. (Previously Presented) The diverse population of claim 120, wherein the target molecule is unlabeled.

123. (Currently Amended) The diverse population of any one of claims 90-~~11994~~, wherein ~~each said genedigit and each said antigenedigit is DNA, and wherein~~ each said genedigit and each said corresponding antigenedigit are attached to one another noncovalently via hybridization.

124. (Currently Amended) The diverse population of any one of claims 90-~~11994~~, wherein each of at least two of said genedigits comprises a repeated core element.

125. (Canceled)

126. (Currently Amended) The diverse population of any one of claims 90-~~11994~~, wherein said plurality of said genedigits is at least four genedigits, said at least four genedigits being each attached to a respective anti-genedigit.

127. (Currently Amended) The diverse population of any one of claims 90-~~11994~~, wherein said plurality of said genedigits is at least five genedigits, said at least five genedigits being each attached to a respective anti-genedigit.

128. (Currently Amended) The diverse population of any one of claims 90-~~11994~~, wherein at least one label monomer is light-emitting.

129. (Previously Presented) The diverse population of claim 128, wherein said label monomer is fluorescent.

130. (Currently Amended) The diverse population of any one of claims 90-~~11994~~, wherein each of said uniquely labeleds probes comprises a mixture of two or more different label monomers.

131. (Currently Amended) The diverse population of any one of claims ~~91, 93, 95, 97, 100, 102, 107, 109, 111, or 112, 90 or 92-94~~, wherein the target-specific nucleotide sequence~~region~~ in each unique label is different.

132. (Currently Amended) The diverse population of any one of claims 90-~~11994~~, wherein at least one label monomer is a quantum dot.

133. (Currently Amended) The diverse population of any one of claims 90-~~11994~~, wherein at least one anti-genedigit is a dendrimer.

134. (Previously Presented) The diverse population of claim 133, wherein the dendrimer is a fork-like dendrimer.

135. (Previously Presented) The diverse population of claim 133, wherein the dendrimer is a comb-like dendrimer.

136. (Currently Amended) The diverse population of any one of claims 90-~~11994~~, wherein each said anti-genedigit is covalently attached to each said at least one label monomer.

137. (Previously Presented) The diverse population of claim 136, wherein each said at least one label monomer is fluorescent.

138. (Currently Amended) The diverse population of any one of claims 91,~~95~~  
and 113-119, wherein each said target molecule is attached to a chip, microarray or bead.

139. (Previously Presented) The diverse population of claim 120, wherein each said target molecule is attached to a chip, microarray or bead.

140. (Canceled)

141. (Previously Presented) The diverse population of claim 122, wherein each said target molecule is attached to a chip, microarray or bead.

142. (Currently Amended) The diverse population of any one of claims 90-  
~~119~~94, comprising 40 or more unique labels.

143. (Previously Presented) The diverse population of claim 142, comprising 100 or more unique labels.

144. (Previously Presented) The diverse population of claim 143, comprising 150 or more unique labels.

145. (Previously Presented) The diverse population of claim 144, comprising 200 or more unique labels.

146. (Previously Presented) The diverse population of claim 145, comprising 500 or more unique labels.

147. (Previously Presented) The diverse population of claim 146, comprising 1,000 or more unique labels.

148. (Previously Presented) The diverse population of claim 147, comprising 2,000 or more unique labels.

149. (Previously Presented) The diverse population of claim 148, comprising 5,000 or more unique labels.

150. (Previously Presented) The diverse population of claim 149, comprising  $1 \times 10^4$  or more unique labels.

151. (Currently Amended) A diverse population of labels uniquely labeled probes, comprising thirty or more unique-label target-specific polynucleotide probes that each have a detectable signal that distinguishes it from the other labels of the population, wherein each of said unique-label polynucleotide probes comprises ~~a molecule, said molecule comprising a~~ target-specific region and a region comprising a plurality of genedigits linked together in a unique combination, each genedigit being of predetermined nucleotide sequence, wherein at least two of said genedigits have a different nucleotide sequence, wherein ~~are~~ each different genedigit is attached to a respective-corresponding anti-genedigit having a unique label monomer or a unique combination of label monomers, ~~each said anti-genedigit being attached to at least one label monomer~~, and wherein said label monomer is a quantum dot.

152. (Currently Amended) A diverse population of labels uniquely labeled probes, comprising 100 or more unique-label target-specific polynucleotide probes that each have a detectable signal that distinguishes it from the other labels of the population, wherein each of said unique-label polynucleotide probes comprises ~~a nucleic acid molecule, said nucleic acid molecule comprising~~ (i) a region comprising at least four genedigits linked together in a unique combination, each genedigit being of predetermined nucleotide sequence, wherein said at least



four genedigits have a different sequence, wherein are each different genedigit is noncovalently hybridized to a respective corresponding anti-genedigit having a unique label monomer or a unique combination of label monomers, each said anti-genedigit being attached to at least one label monomer; and (ii) a target-specific nucleotide sequence, said target-specific nucleotide sequence being noncovalently hybridized to an unlabeled target molecule, wherein each label comprises a different target-specific nucleotide sequence.

153. (Previously Presented) The diverse population of claim 152, wherein each said anti-genedigit is covalently attached to each said at least one label monomer.

154. (Currently Amended) The diverse population of claim ~~154~~152, wherein said at least one label monomer is fluorescent.

155. (Previously Presented) The diverse population of any one of claims 152-154, wherein each said nucleic acid molecule is noncovalently attached via hybridization to an unlabeled bridging nucleic acid.

156. (Previously Presented) The diverse population of one of claims 152-154, wherein each said unlabeled target molecule is attached to a chip, microarray or bead.

157. (Currently Amended) A labeling kit, said kit comprising (i) in a first container, thirty or more unique polynucleotide molecules, each said polynucleotide molecule comprising a plurality of genedigits linked together in a unique combination, each genedigit being of predetermined nucleotide sequence, wherein at least two of said genedigits have a different sequence, and (ii) in one or more other containers, a plurality of respective corresponding anti-genedigits, each said corresponding anti-genedigit being attached to ~~at least one~~ a unique label monomer or a unique combination of label monomers.

158. (Previously Presented) The labeling kit of claim 157, wherein each of at least two of said genedigits comprises a repeated core element.

159. (Previously Presented) The labeling kit of claim 157, wherein at least one label monomer is light-emitting.

160. (Previously Presented) The labeling kit of claim 159, wherein said label monomer is fluorescent.

161. (Previously Presented) The labeling kit of claim 157, wherein at least one label monomer is a quantum dot.

162. (Previously Presented) The labeling kit of claim 157, wherein at least one anti-genedigit is a dendrimer.

163. (Previously Presented) The labeling kit of claim 162, wherein the dendrimer is a fork-like dendrimer.

164. (Previously Presented) The labeling kit of claim 162, wherein the dendrimer is a comb-like dendrimer.

165.-166. (Canceled)

167. (Currently Amended) The labeling kit of claim ~~165~~157, wherein each molecule further comprises a target-specific nucleotide sequence.

168. (Currently Amended) The labeling kit of claim ~~165~~157, wherein each molecule is noncovalently attached to an unlabeled bridging nucleic acid.

169. (Previously Presented) The labeling kit of claim 157, comprising 40 or more unique molecules.

170. (Previously Presented) The labeling kit of claim 169, comprising 100 or more unique molecules.

171. (Previously Presented) The labeling kit of claim 170, comprising 150 or more unique molecules.

172. (Previously Presented) The labeling kit of claim 171, comprising 200 or more unique molecules.

173. (Previously Presented) The labeling kit of claim 172, comprising 500 or more unique molecules.

174. (Previously Presented) The labeling kit of claim 173, comprising 1,000 or more unique molecules.

175. (Previously Presented) The labeling kit of claim 174, comprising 2,000 or more unique molecules.

176. (Previously Presented) The labeling kit of claim 175, comprising 5,000 or more unique molecules.

177. (Previously Presented) The labeling kit of claim 176, comprising  $1 \times 10^4$  or more unique molecules.

178. (Previously Presented) The diverse population of any one of claims 91-94, 113, and 115-119, wherein the labels are spread on a two-dimensional surface.